

7A - Cells

Summary Notes

Life Processes

All living things do all seven of the life processes. Things that are not living may do some but do not do all seven of the life processes. These are:

Movement

Respiration

Sensitivity

Growth

Reproduction

Excretion

Nutrition

Viruses are difficult to classify as living or non-living. They are not cellular and do not do all of the seven processes above. They can only reproduce when they are inside a cell, but can survive for years outside of a cell, showing no signs of life until they are inside a cell again.

Cells

An organism is any living thing.

All organisms are made up of cells.

Cells are the building blocks that make up living things.

Organisms can be unicellular (consist of only one cell) or multicellular (contains many cells)

Cells are microscopic.

Microscopic means “very small to see.”

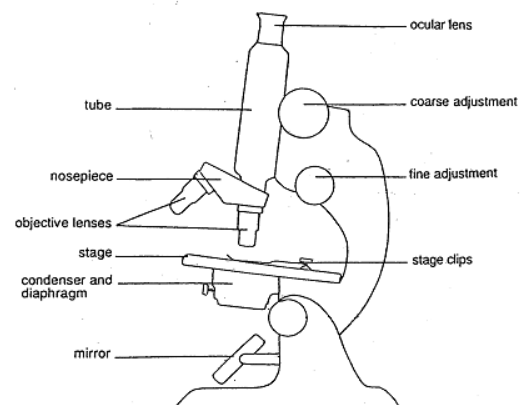
Therefore cells need to be looked at them under a microscope.

Structure of a Microscope

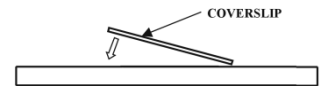
While there are different types of microscope we will be concentrating on the light microscope. Most modern microscopes, instead of a mirror have an inbuilt light source.

Magnification means get bigger.

The total magnification of an object is the magnification of the ocular (eyepiece) lens times the magnification of the objective lens.



The specimen is put on a microscope slide and covered with a cover slip. This can be done with a mounted needle.



Objects are often difficult to view under the light microscope because of lack of contrast between the object and the surroundings. To increase the contrast staining is used.

Staining is used for the following reasons

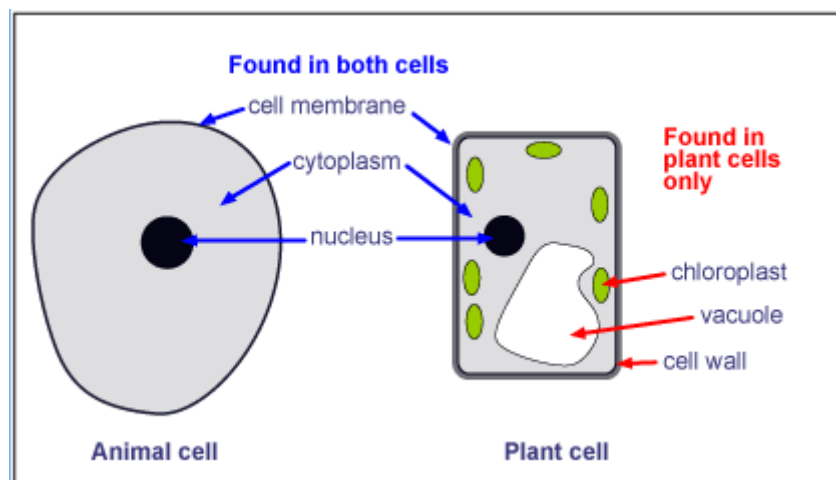
- Enables differentiation between different components in the cell.
- Can cause transparent and translucent structures within the cell to become apparent.
- Allows the composition of various parts of the cell to be determined.

The process of staining may kill or change the cell in some way.

Structure of cells

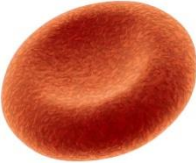

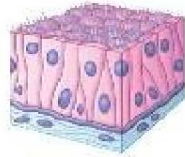
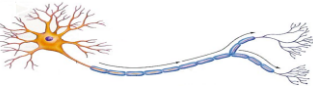



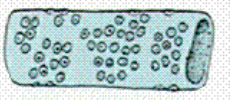
Cells are small liquid filled sacs. They are 3 dimensional. They contain many different structures to help them grow, divide and perform lots of different functions.

The general structure is shown below.



Part of cell	Function (what it does)	Plant, animal or both
Cell wall	Support and shape.	Plant
Cell membrane	Controls what goes in and out of cell.	Both
Nucleus	Controls all the activities of the cell. Contains all the genetic information.	Both
Cytoplasm	Jelly like substance where chemical reactions take place.	Both
Vacuole	Many functions including storage of waste and water.	Large in plants, small or missing in animals
Chloroplast	Used in photosynthesis (the process where plants make their own food).	Some plant cells.

Cells are specialised to perform particular jobs.

Cell	Diagram	Function	Adaptations
Red blood cells		Carry oxygen around body.	No nucleus (able to carry more oxygen), biconcave shape (flexible).
Muscle Cells		Movement.	Able to change length.
Ciliated epithelium		Wafts mucus, dirt and bacteria up to back of throat.	Cilia (hair like structures).
Nerve Cell		Carries electrical signals around body.	Can be long, branched.
Sperm cell		Fertilises an egg cell.	The tail helps the sperm move to the egg. The head contains genetic information. Head also has an enzyme to help penetrate the egg cell.
Palisade cell		Photosynthesis (process where plants make their own food).	Contain lots of chloroplasts.
Root hair cell		Absorbs water and minerals from the soil.	Has large surface area and a thin wall.
Xylem		Transports water up a plant.	Hollow.

Cells to organisms

Clearly organisms are more than collections of cells. The organisation of an organism is:

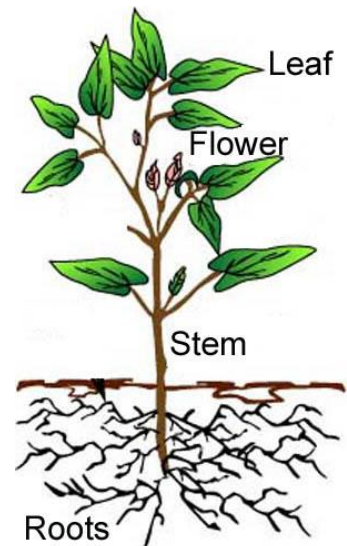
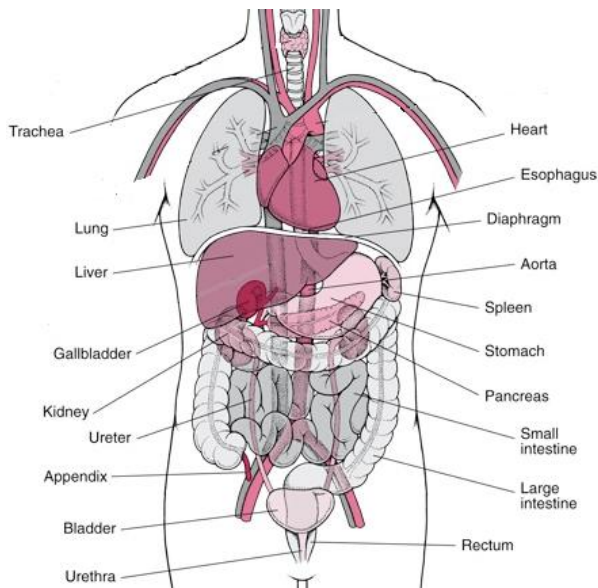
Cell -----> Tissue -----> Organ -----> System -----> Organism

Level of Organisation	Definition	Example
Cell	The building block of all living things.	Red blood cell
Tissue	Group of similar cells that work together to perform a particular job	Cardiac muscle
Organ	A group of different tissues that work together.	Heart
System	Groups of organs that work together. The organs in a system are linked together by tubes or vessels.	Circulation
Organism	All the systems work together to form the whole organism.	Human

There are many different organ systems in the body including:

System	Organs and tissues include	Function
Circulation	Heart, blood vessels (arteries, veins and capillaries).	Transports nutrient and wastes around the body in the blood.
Respiratory	Trachea (windpipe), lungs, diaphragm.	Taking in oxygen and removing carbon dioxide.
Digestive	Oesophagus (gullet), stomach, large intestine, small intestines, anus.	Breaks down food into simple substances.
Excretory	Kidneys, bladder.	Removes waste.
Nervous	Sense organs, brain, spinal cord, nerves.	Sends messages around body.
Endocrine (hormone)	Endocrine glands including thyroid, pancreas, ovaries and testes.	Makes and releases hormones.
Muscular – Skeletal	Bones, cartilage, muscles, tendons and ligaments.	Support and movement.
Reproduction	Uterus, vagina, ovaries, fallopian tube, penis, sperm duct, testes.	Producing offspring.

Here is the location of some of the organs in humans and plants:



Plant Organs

Organ	Function
Leaf	Photosynthesis (make food).
Petals	Attract pollinators.
Roots	Absorb water and minerals from soil, anchor plant in ground.

Making new cells

New cells can only be made from existing cells. New cells need to be made:

- to replace cells
- to grow
- to produce offspring

There are two types of cell division:

- for growth and repair
- to make sex cells, for reproduction.

Steps in making new cells:

1. Growth – the cell grows bigger
2. Duplicating – the chromosomes (that contain all the genetic information) are copied. The nucleus divides.
3. Division – the two nuclei go to opposite ends of the cell. The cells split into two.

The male sex cell is sperm in animals and pollen in plants. The female sex cell is the egg or ovum.

To form new offspring the male and female sex cell joins together in a process called fertilisation.

The reproductive part of a plant is the flower.

Pollination is the transfer of pollen from a stamen (which makes the pollen) to a pistil.

